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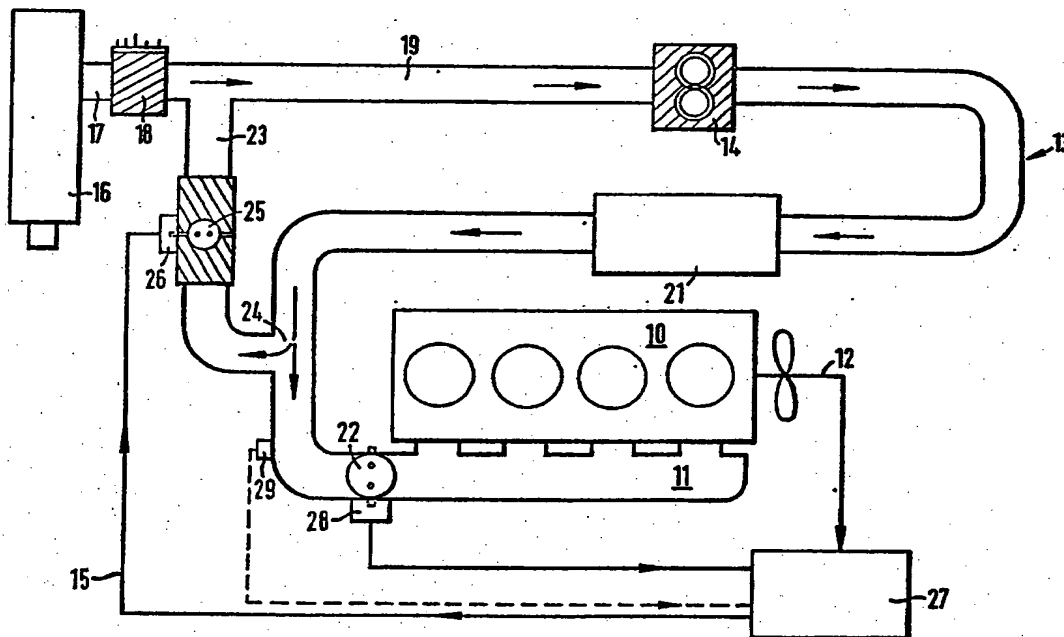
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(64) A supercharged I.C. engine air/fuel induction system

(67) The supercharger (14) has a recirculation bypass (23) with a recirculation control valve (25) which is controlled by a microprocessor (27) in response to engine speed and preferably also in response to the setting of the throttle valve (22) and the pressure between the supercharger and the throttle valve to be closed at high engine loads. The drive ratio of the supercharger may be controlled by the microprocessor.



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combustion air/fuel induction system.

The sketch shows an internal combustion engine 10 having an intake manifold 11, a crankshaft 12, an air/fuel induction system 13 including a supercharger 14, and a boost pressure control circuit 15.

The air/fuel induction system 13 comprises an air cleaner 16 having a clean air outlet 17 connected to an upstream end of an air supply passage of a single point air/fuel metering unit 18 which incorporates fuel injection means.

The downstream end of the air supply passage of the unit 18 is connected to an inlet of the supercharger 14 by one part 19 of an air/fuel induction passage which leads to the intake manifold 11 through the supercharger 14 and an inter-cooler 21 which is downstream of the supercharger 14. The usual driver-operable throttle valve 22 is provided at the junction of the air/fuel induction passage and the intake manifold 11.

A recirculation passage 23 interconnects one location 24 in the air/fuel induction passage between the inter-cooler 21 and the throttle valve 22 with another location in the induction passage part 19. A bypass control valve 25 is provided in the recirculation passage 23 to control flow through the recirculation passage 23 from the location 24 to the passage part 19. Operation of the control valve 25 is controlled by an electrically operable servomotor 26.

The boost pressure control circuit 15 comprises a programmable microprocessor 27 connected to receive input data in the form of an engine speed signal conveniently generated by rotary speed sensing means operatively associated with the crankshaft 12, a throttle position signal conveniently generated by a rotary potentiometer 28 operatively associated with the spindle of the driver-operable throttle valve 22, and a boost pressure signal generated by a pressure sensitive transducer 29 in the air/fuel induction passage between the location 24 and the driver-operable throttle valve 22. The microprocessor 27 is programmed to output an operating signal to control operation of the servomotor 26 and thereby modulate the bypass control valve 25 to a predetermined setting and thus control air flow through the recirculation passage 23 in accordance with the input data received by the microprocessor 27. Thus the pressure of the air/fuel mixture fed to the driver-operable throttle valve 22 is dependent upon the input data fed to the microprocessor 27 and the programme with which the microprocessor 27 is programmed. In practice the programme would be arranged so that the pressure would be high when the engine load demand is high and would be low when the engine load is light.

In another embodiment a supercharger in an air/fuel induction system of an internal combustion engine is provided with variable means operable to vary the drive ratio of the supercharger, the setting of the variable means being determined by an output of a microprocessor which receives input signals indicative of certain operating parameters of the engine, such as throttle angle and engine speed. The microprocessor may be a matrix type electrical control unit.

CLAIMS

1. An i.c. engine air/fuel induction system comprising an induction passage, an operator-operable throttle valve for controlling mass flow through the induction passage to the engine, and supercharging means in the induction passage upstream of the throttle valve operable to boost the pressure of fluid fed to the throttle valve when the required engine power is higher than that of the engine when naturally aspirated, the supercharging means including a recirculation control valve which interconnects the inlet and outlet of the supercharging means and which is operable to control the output of the supercharging means, wherein the recirculation control valve is operable automatically in response to engine speed.

2. An i.c. engine air/fuel induction system according to Claim 1, wherein the recirculation control valve is operable in accordance with the setting of the operator-operable throttle valve as well.

3. An i.c. engine air/fuel induction system according to Claim 2, wherein the control valve is controlled electronically by means including a microprocessor and which receives input data derived from an engine speed sensor and a throttle position sensor operatively associated with the operator-operable throttle valve, and which is programmed to output a signal to a servomotor, the servomotor being operable to modulate the recirculation control valve and set it at a predetermined position appropriate for the sensed operator-operable throttle valve position and engine speed.

4. An i.c. engine air/fuel induction system according to Claim 3, wherein the microprocessor is also connected to receive input data from a boost pressure transducer which is operable to sense pressure of flow in the induction passage between said supercharging means and the operator-operable throttle valve and to emit a signal to the microprocessor derived from that pressure.

5. An i.c. engine air/fuel induction system according to Claim 3 or Claim 4, including a feedback loop by which a signal indicative of the position of the recirculation control valve is fed to a respective input of the microprocessor.

6. An i.c. engine air/fuel induction system comprising an induction passage, an operator-operable throttle valve for controlling mass flow through the induction passage to the engine, and supercharging means in the induction passage upstream of the throttle valve operable to boost the pressure of fluid fed to the throttle valve, wherein the supercharging means are provided with variable means operable to vary the supercharger drive ratio and control means operable to control the variable means, the control means including a microprocessor programmed to output a control signal and thereby effect setting of the variable means for a predetermined supercharger drive ratio, in response to input data indicative of certain sensed engine operating parameters such as operator-operable throttle valve angle and engine speed.

7. An i.c. engine air/fuel induction system

according to Claim 6, wherein the microprocessor incorporates a matrix type electrical control unit.

8. An i.c. engine air/fuel induction system substantially as described hereinbefore with reference to the accompanying drawing.

9. An i.c. engine air/fuel induction system according to Claim 8 and substantially as illustrated in the accompanying drawing.

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